

Old Cornstone Workings in Dunbartonshire and West Stirlingshire, with Notes on their Associated Flora

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In Scotland the use of lime as an agricultural fertiliser dates from the first half of the 17th century, as subsistence farming began to slowly evolve into an agribusiness to provide for the growing towns and industrial villages. With the need for a mineral fertiliser to sustain the increased yield, farmers in the southernmost parts of Dunbartonshire and West Stirlingshire purchased their requirements from the lime works at Baljaffray, Baldernock, Lennoxton and Kilsyth. All of these commercial establishments in the central belt were sited on the main seams of Carboniferous limestone underlain by coal. Before the advent of crushing machines, burning the quarried limestone with coal in special kilns and then slaking the resultant calcined lime (quicklime) with water was the only practicable method available for reducing the hard rock into a soluble powder.

At a disadvantage compared with their southern neighbours, landowners and tenants who farmed in the more distant parts of the two counties faced prohibitive charges for transportation of the professionally prepared lime. It is implied in one agricultural report (Ure, 1794) that the extra cartage involved more than doubled the product's selling price at the works' gate. Not surprisingly, some of these farmers turned to nearer to hand calcium carbonate rich deposits, both the quarrying and the burning of the rock (usually with peat turves) being carried out by farm labourers in their employ. Four alternative sources of mineral fertiliser were exploited - the Glen Fruin and Ardenconnel blue-black limestone which outcrops in the southern highland slates, carbonated serpentinite associated with the Highland Boundary Fault, cementstones of the Ballagan Beds and cornstone known locally as 'moor limestone'.

The origin, history and distribution of cornstone.

The derivation of the term cornstone is obscure. Its use as a fertiliser in the cultivation of cereal crops might seem the most obvious explanation, but it is equally likely that the name comes from cornstone's granular texture (Arkell & Tomkeieff, 1953). Atypical in being a terrestrial rather than a marine limestone, cornstones are fossil soils formed under semi-arid conditions. During periods of sustained drought lime-rich water is drawn up by capillary action to the land surface, where the calcium carbonate is precipitated in the sub-soil by evaporation. A more detailed description of the process - under cornstone's other name of caliche - is given by Bluck (1992).

The place of cornstone in the history of science was firmly established when, during a visit to the Isle of Arran in August 1787, the Edinburgh-born pioneer geologist James Hutton observed horizontally bedded cornstone and sandstone resting directly on top of steeply inclined and worn-down highland schist. This discovery, the first of Hutton's world-famous 'unconformities', was to greatly influence future thinking on the never-ending cycle of erosion and deposition of the earth's surface.

Cornstones in Scotland are almost entirely confined to the Upper Old Red Sandstone laid down during the Devonian period over 360 million years ago. In Dunbartonshire and Stirlingshire the Upper Old Red Sandstone occurs in two broad bands, the southernmost running ENE from Dumbarton - Cardross to within a few kms of Stirling. The other runs NE from Helensburgh to the west side of Loch Lomond, with outlying outcrops on several of the islands and on the opposite side of the loch just north of the Conic - Gualann ridge. Both bands contain concretionary masses of cornstone.

Local cornstone working

Unlike commercial lime works, the 'do-it-yourself' quarrying and burning of cornstone by non-professionals lacks the trade documentation so valuable to industrial archaeological research. Never-the-less, enough fragmentary descriptions of the practice have been published (e.g. Ure, 1794) to be able to piece together its operation and time-

scale in Dunbartonshire and West Stirlingshire. The first mention of cornstone quarrying and burning in the area is to be found in the Balgair Barony Court records for 1707 (Dunlop, 1957), the same Balgair Muir workings (Plate 1a, page 493) also providing the last known occasion when the quarry was reported to have been temporarily reopened in 1862, after lying neglected for 60 years (*Stirling Journal* 15 August 1862).

All the available documentary evidence suggests that cornstone working for agricultural fertiliser reached its peak during the second half of the 18th century, virtually ceasing with the collapse of grain prices which followed the end of the Napoleonic wars in 1815. Apart from economic reasons, there can be little doubt that by the turn of the 19th century most of the readily quarried deposits of cornstone in the area were already exhausted. So complete was the removal of all surface cornstone, that only a few above-ground outcrops remain today. The largest undisturbed remnant by far (Plate 1b, page 493), occurs just to the south-west of the Lang Dyke on Dumbarton Muir. With its water-worn fissures or 'grikes', this untouched exposure illustrates the relative ease with which cornstone could be quarried using only the most basic hand tools such as crowbars and stone hammers.

Site Survey

Beginning in 1982, a field survey of the old cornstone workings in Dunbartonshire and West Stirlingshire proved not a moment too soon. One of the sites was damaged by forestry operations almost immediately after it had been located and examined. The object of the project was twofold:

- (i) To archive a permanent record of this long disappeared industry with the Drymen and District Local History Society. A copy of the report (Mitchell & Mitchell, 1983) has been placed in the Glasgow Natural History Society library.
- (ii) To pin-point those former cornstone workings which today provide a habitat for plants of calcareous grassland, flushes and mire. The present account includes a short list of the less common plant species associated with the Dunbartonshire and West Stirlingshire cornstone quarries, spoil heaps and wet hollows.

As a preliminary desk study, every piece of documented information on cornstone working in the study area was extracted from parish records contained in the first *Statistical Account of Scotland*, the first and second editions of county agricultural reports, large-scale ordnance and geological maps. For site detail, the original mid-19th century geological survey field slips proved to be particularly valuable. A mineral resource report *The Limestones of Scotland* (Robertson *et al*, 1949) lists cornstone deposits and former workings in Renfrewshire, Lanarkshire, Ayrshire and Bute, but unfortunately none in Dunbartonshire or Stirlingshire. The regional memoir *Geology of the Stirling District* (Francis *et al*, 1970) briefly describes one cornstone quarry on the study area's eastern fringe.

To date, at least ten former cornstone quarries and surface workings have been identified in Dunbartonshire and West Stirlingshire. In Table 1, only a central map reference is given where the workings are extensive or scattered.

Notes on the cornstone flora in the study area

The botanical interest of cornstone is almost exclusively confined to where the calcium carbonate availability to plants is enhanced by quarrying operations, surface flushing resulting from rainfall permeating through the bedrock, and mire formation where the lime-rich water has collected in natural or man-made hollows.

In common with all herb-rich pastures, a moderate level of grazing by farm stock is essential to hold in check the more vigorous herbaceous species and scrub. In recent years however, there has been a trend towards using such fields for stock grazing for twelve months in the year. Under continual trampling by cattle, any mire development present can be severely damaged. But without question the principal threat to cornstone open grassland habitat is forestry ploughing and planting. Whichever the change in management, most of the botanical diversity of the original habitat is soon lost.

Many of the plants to be found on the cornstone are widespread throughout Dunbartonshire and West Stirlingshire. The twenty-one species selected for the list below (Table 2) have been chosen because

of their localised distribution within the two counties. Individual cornstone workings where these plants have been recorded are identified by the site number given in Table 1.

Table 1. Cornstone workings in Dunbartonshire and West Stirlingshire.

Dunbartonshire:

1. Garrawy Glen	NS315830	Wooded.
2. Kipperoch	NS368783	Kiln Present.
[Note: site currently heavily poached by cattle].		
3. Carman Muir	NS372785	
[Note: site partially drained for forestry in 1986, but planting not carried out].		
4. Upper Dalquhurn	NS382786	Wooded.
[Note: site currently heavily poached by cattle].		
5. Merkins Muir	NS441809	Kilns present.

West Stirlingshire:

6. Tom nam Buachaille	NS425932	Kilns nearby.
7. Mar and Cross Burns	NS437935	Kilns present.
8. Wester Balgair	NS592897	Kilns present.
9. Balgair Muir	NS610910	Kilns present.
[Note; western half of site partially drained and afforested in 1983].		
10. Powside	NS623915	Kilns present.

Table 2. Local species occurring in Dunbartonshire and West Stirlingshire cornstone workings.

Species	Sites
<i>Selaginella selaginoides</i> (Lesser Clubmoss)	2,3,5,6,7,9,10.
<i>Sagina nodosa</i> (Knotted Pearlwort)	3,9.
<i>Anagallis tenella</i> (Bog Pimpernel)	2,3.
<i>Saxifraga aizoides</i> (Yellow Mountain Saxifrage)	6,7.
<i>Parnassia palustris</i> (Grass-of-Parnassus)	3,5,6,10.
<i>Gentianella campestris</i> (Field Gentian)	9,10.
<i>Galium uliginosum</i> (Fen Bedstraw)	8,9,10.
<i>Antennaria dioica</i> (Mountain Everlasting)	9,10.
<i>Eriophorum latifolium</i> (Broad-leaved Cottongrass)	2,3,6,8,9,10.
<i>Eleocharis quinqueflora</i> (Few-flowered Spike-rush)	2,3,4,5,6,7,8,9,10.
<i>Carex diandra</i> (Lesser Tussock-sedge)	9,10.
<i>C. dioica</i> (Diocious Sedge)	2,3,5,6,7,8,9,10.
<i>C. hostiana</i> (Tawny Sedge)	2,3,4,5,6,7,8,9,10.
<i>C. viridula</i> ssp. <i>brachyrrhyncha</i> (Long-stalked Yellow Sedge)	2,3,5,6,8,9,10.

Table 2 continued on next page

Table 2 continued

<i>Helictotrichon pubescens</i> (Downy Oat-grass)	2,9.
<i>Listera ovata</i> (Common Twayblade)	2,4.
<i>Platanthera chlorantha</i> (Greater Butterfly-orchid)	9.
<i>P. bifolia</i> (Lesser Butterfly-orchid)	2,3,8,10.
<i>Gymnadenia conopsea</i> (Fragrant Orchid)	2,3,8,9,10.
<i>Coeloglossum viride</i> (Frog Orchid)	9.
<i>Dactylorhiza incarnata</i> (Early Marsh-orchid)	8,10.

Cornstone workings elsewhere in the Clyde Area

No systematic coverage of old cornstone workings elsewhere in the west of Scotland was undertaken as part of the project. However, the opportunity was taken by the writer of examining three former cornstone quarries during visits to Bute, Arran and south Ayrshire.

By the middle of the last century the Kelspoke quarry on the Isle of Bute was already partially flooded, the site being subsequently adopted as a permanent water supply for the nearby village of Kilchatton. The same horizon of cornstone does, however, outcrop along the shore line in the south-east corner of the island, with some evidence of quarrying near Hawk's Nib. There the botanical interest lies in the lime-influenced flushes below the cliffs of the raised beach. On the Isle of Arran, the Clauchan Glen cornstone quarry to the east of Shiskine was virtually obliterated when it was planted over by the Forestry Commission in 1974. Fortunately, the Auchalton cornstone workings near Crosshill in Ayrshire have fared considerably better than the two quarries above, the spoil heaps with their species-rich flora having been managed as a grassland nature reserve since the site was acquired by the Scottish Wildlife Trust in 1979.

Further survey work on old cornstone workings throughout the southern half of the Clyde area would almost certainly prove worth while. With the combination of the rock's unusual origin, its early role in regional agricultural development and more recently as a refuge for plants of calcareous and unimproved grassland, cornstone has much to offer of interest to geologists, local historians and botanists alike.

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Dunbartonshire and West Stirlingshire, and to Ken Mackay for helpful discussion on the local limestone industry of the past. Special thanks also go to Allan Stirling, Bill Brackenridge, Anne Carstairs and Keith Futter for sharing my interest in the vegetation associated with the old cornstone workings and providing a number of additional botanical records.

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Book Reviews

Urban Nature Magazine

Urban Environmental Trust Ltd., 40 Milford Rd., Birmingham, 1992-, 44pp. per part, 2 parts annually, illustrated. ISSN 0965 2086, individual sub. £17.50; corporate sub. £30.00.

This magazine is concerned with nature and ecological processes in the urban environment. First published in Spring 1992, the magazine examines environmental policies and experience, Articles have covered city pollution, problems arising from over-managed landscapes and green politics. The susceptibility of environmental studies to other forces are fairly shown and also the way in which this creates difficulties for urban ecology as a subject and a science in the politically green world. These concerns are balanced by interesting articles, e.g. on Magpies' use of man-made structures as nest sites and as nest material. Highlighting birds' and animals' experience in the urban environment is important and it is good to escape the plethora of cosy wildlife magazines. The Urban Nature Magazine contributes to the understanding of wildlife and the politics which surround it and is recommended.

BRIAN S. SKILLEN

Wildfowl

MALCOLM OGILVIE, illustrated by BRUCE PEARSON
 Hamlyn Bird Behaviour Guides, Hamlyn, London, 1994., 160 pp.,
 numerous coloured & monochrome illustrations. Hardback, ISBN
 0 600 57973 5, £14.99.

It only takes a visit to any local park where there is a duck pond to appreciate that waterfowl are fascinating birds. They fight, display, feed, call and otherwise go through many different behaviour patterns, often in a short space of time. This book will answer many of the questions posed by wildfowl behaviour and much more. There are chapters covering feeding, flying, social behaviour and care of plumage as well as a gazetteer of places in western Europe where amazing concentrations of wildfowl can be found. Virtually all European wildfowl species are covered at some point in the text.

Malcolm Ogilvie has produced an excellent review of wildfowl behaviour in a style which will be easily understood by novice and expert alike. This well-written book is complemented by the illustrations. The artist, Bruce Pearson, conveys life and action in his studies and sketches of the birds.

All in all I highly recommend this book, and it is a reasonable price.

BERNARD ZONFRILLO

Hedgehogs

NIGEL REEVE
 T. & A.D. Poyser Ltd., 1994, 313pp., many line drawings and
 figures, 28 colour plates. Hardback, ISBN 0 05661 081 X, £25.00

Most people have a warm affection for hedgehogs and there have recently been a number of scientific studies carried out on these engaging animals. Nigel Reeve has carried out radio-tracking studies on their movements and on other aspects of their ecology and has now written a popular account which summarises recent studies and also gives a good account of their general natural history and folklore. The book starts with a general description of the various hedgehog species around the world and then gives chapters on the types of food which they eat, the way in which they forage, their behaviour, breeding cycle, hibernation periods and population dynamics. It is clearly written and well illustrated with line drawings, figures & photographs.

Apparently the spines not only give the animals protection, but also serve as excellent shock-absorbers which allow them to fall safely from a great height. Hedgehogs are also resistant to snake venom, which allows them to include adders in their diet. The book gives you information on how to look after sick animals and also tells you how to unroll a hedgehog: you bounce it gently up and down in your hand. It is produced to the very high standard that we have come to expect from Poyser publications and is a joy to read, full of unexpected and interesting facts, and will be appreciated by anyone with an interest in these delightful animals.

DAVID C. HOUSTON

Plate 1



a: Balgair Muir cornstone quarry before afforestation in 1983.



b: Undisturbed exposure of cornstone on Dumbarton Muir.

Plate 2



a: Part of the orchid colony at Lanarkshire's "Nose".



b: Close-up of the orchid colony



c: Common Spotted-orchid x Northern Marsh-orchid